PROCEEDINGS

BUILDING THE FOUNDATION

2018 Dairy and Veal Healthy Calf Conference

Tuesday, November 27
Stratford, ON
Thursday, November 29
Maxville, ON

VEAL Farmers of Ontario

Your calf care partners

A message from the Chair

Thank you for attending the eighth biennial *Building the Foundation: Dairy and Veal Healthy Calf Conference*. We know there are many industry events throughout the year and we appreciate that the *Healthy Calf Conference* is on your "must-see" list. It is always encouraging to see how many people place a high importance on raising calves well. Understanding that calves are the future herd is key to success on the most profitable farms.

Just like on your farm, calf care is a core priority at Veal Farmers of Ontario (VFO). Ensuring that all calves are well -managed creates profitable and productive dairy and veal industries. VFO has spent many years advancing calf research and promoting calf care.

As your calf care partners, VFO has contributed extensive resources into the development of calf care materials to improve the health and welfare of all calves in Ontario. VFO strongly supports and invests in calf research to develop practical, on-farm protocols for producers. Your license fees help to make events like this and the work VFO does possible.

As a member of VFO, you are able to take advantage of calf specific information through regular communications from VFO, including our quarterly magazine and resource mailings. In addition, we are a regular contributor to the *Milk Producer* with monthly calf care articles.

Some of our 2019 calf care initiatives:

- *Calf Care Corner* e-blasts will be moving to monthly
- New quarterly magazine
- New calf specific projects focusing on the health and welfare of **all** dairy calves
- Research dedicated to improving calf health

VFO truly is your calf care partner! Over the past year, we have been more visible to our members by attending industry events and an increased social media presence.

We recognize the important role dairy producers play in the veal industry. When dairy producers sell healthy, strong bull calves, the veal industry thrives. Many dairy farmers are also seeing the benefit of raising their own bull calves for veal to diversify farm profit. For these reasons, VFO works with both dairy and veal producers, as strengthening this relationship is beneficial to us all.

We encourage you to provide feedback to VFO. Let us know if there are specific topics you would like additional information on, whether you find our resources helpful, and if you would recommend any changes. We work for you, our members. If you are not receiving regular communications from VFO, contact the office to ensure we have up to date contact information.

Whether you are raising calves for the dairy or veal industry, focusing on healthy calves is vital. All calves should be treated equally, regardless of their sex.

Lastly, I want to thank our sponsors. Without their support, this premier calf event would not be possible. To our attendees, some of you may be attending for the eighth time and for some the first, we thank you for your support and hope you all return in 2020!

Sincerely,

Tom Kroesbergen,
Chair

VEAL Farmers of Ontario *Your calf care partners*

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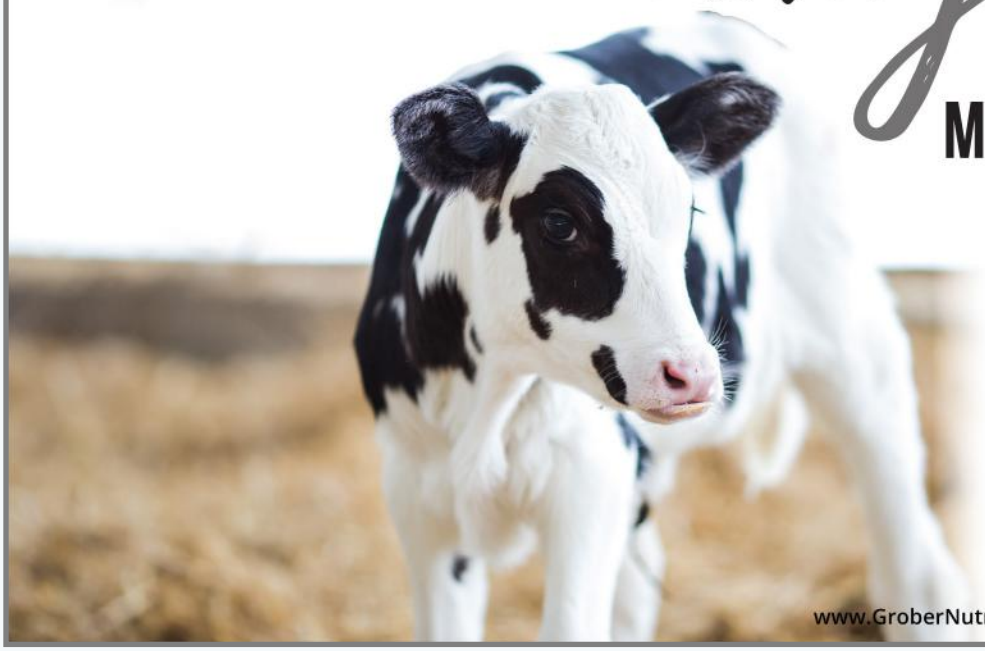

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We've got the latest calf news

Calf Care Corner @CalfCareCorner · Oct 15
Leah Clark, livestock and feed extension specialist with Saskatchewan Agriculture, talks about the one mineral livestock producers need to watch closely to avoid trace mineral deficiencies, the importance of water testing and why you shouldn't gauge...

VIDEO: Test livestock water to avoid trace mineral ...
Leah Clark, livestock and feed extension specialist with Saskatchewan Agriculture, talks about the one mineral livestock producers need to watch closely to avoid trac...
canadiancattlemen.ca

Calf Care Corner @CalfCareCorner · Oct 12
Your smartphone can do a lot. Soon, it may be able to tell you which calves have a fever.

Detecting fever with a phone app
Mycoplasma suis, MMA, swine influenza, Classical Swine Fever or arthritis... The occurrence of fever is what all these health problems have in common. An exact diag...
pigprogress.net

1 3

Calf Care Corner @CalfCareCorner · Oct 10
Having trouble with employees following protocols consistently? Maybe you have a common problem called "helpful employees".

Helpful employees - Dairy
Having trouble with employees following protocols consistently? Maybe you have a common problem called "helpful employees".
canr.msu.edu

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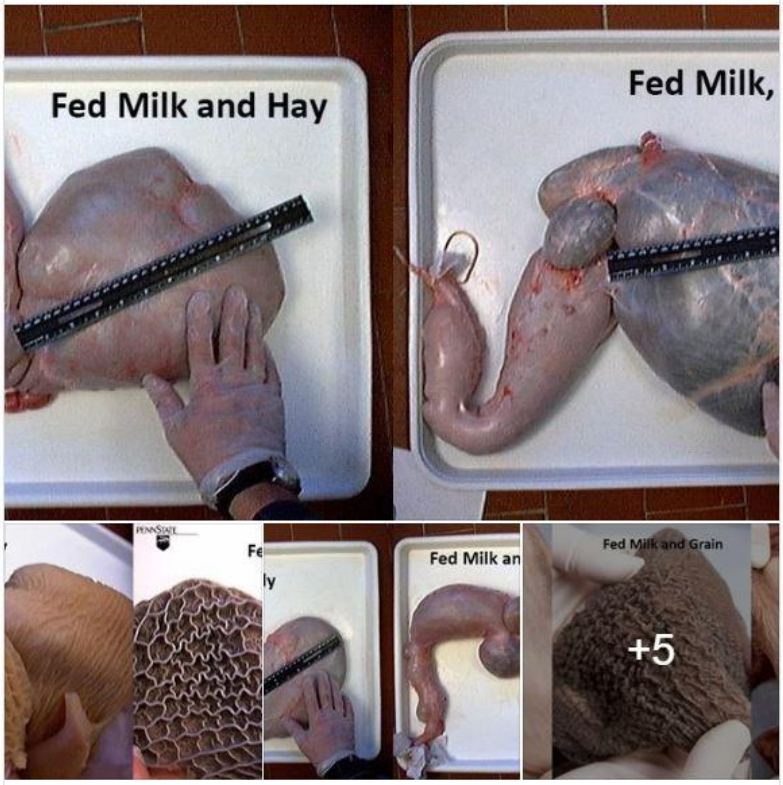
Calf Care Corner @CalfCareCorner · Oct 8
Miss our Fields to Forks vignette on CTV London? See the full video here. Veal Farmers of Ontario are proud of what we do.

Fields to Forks: Veal Farmers of Ontario
The VFO had the opportunity to work with CTV London as part of their Fields to Forks program, which is designed to provide consumers with insight on how our ...
youtube.com

Calf Care Corner
about 5 months ago

This series of photos from PennState illustrates the process of rumen development in dairy calves.

Calves must transition from a simple-stomached animal that digests milk to a ruminant that digests solid feed. The goal is to have a more fully developed rumen before weaning calves off milk. By feeding starter and a little roughage before calves are weaned, they are better prepared (rumen is more developed) to digest the nutrients of solid food once it becomes their sole food s... See More



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VEAL Farmers of Ontario
Your calf care partners

Connect with us!

@CalfCareCorner // @OntarioVeal

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Building the Foundation

Dairy and Veal Healthy Calf Conference 2018

DRAFT AGENDA

8:30 am	**Registration and Tradeshow Open**
9:30 am	**Welcome and Opening Remarks**
9:45 am	**The art of calf nutrition** Dr. Michael Ballou, Texas Tech University
10:45 am	**Group housing of calves: why, when, and how?** Dr. Trevor DeVries, University of Guelph
11:30 am	**LUNCH AND TRADESHOW**
1:00 pm	**How your veterinarian can help you reach your calf goals** Dr. Dave Renaud, University of Guelph
1:45 pm	**Aiming for zero mortality — a calf care panel** Aaron Keunen, Mapleview Agri. Ltd. Laura Schuurman, Joe Loewith & Sons Ltd. Jayne Dietrich, Character Dairy Genetics
3:15 pm	**Wrap up and Adjourn**

VEAL Farmers of Ontario *Your calf care partners*

Are your calves getting the best possible start?

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INFORCE 3

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Dr. Michael Ballou

What if reducing the risk of respiratory disease and scours in your calves was as easy as feeding them the right diet? It can be! Dr. Ballou shares the secrets to feeding calves to prevent these common calfhood diseases by developing calf immunity through nutrition.

Michael Ballou is an Associate Dean for Research and a Professor of Nutritional Immunology in the College of Agricultural Sciences and Natural Resources at Texas Tech University. He completed a Bachelor's degree in Animal Science from the University of California, Davis in 2002. Michael remained at UC Davis and completed a Ph.D. in Nutritional Biology with an emphasis in Immunology in 2007. Michael's research is primarily focused on how nutrition and management influence the health and performance of dairy calves, heifers, and periparturient cows. He has authored or co-authored over 60 peer-reviewed articles, one book chapter, and 120 scientific meeting abstracts. Michael has received research support from private foundations, industry, the USDA, and the US State Department.

VEAL Farmers of Ontario

Your calf care partners

Nutritional Strategies to Improve the Health & Performance of Dairy Calves

Michael A. Ballou, Ph.D.
Associate Dean for Research & Professor
Department of Veterinary Sciences
Texas Tech University, Lubbock, TX, USA
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(806) 543-5653

Outline

- Why do pre-weaned calves get sick?
  - Development of gastrointestinal immunity
- Nutrition and immunity of calves
  - Reducing interaction of pathogens with calf
  - Plane of nutrition during pre-weaned period
  - Early life nutrition influence health later in life?

Why do so many calves get sick?

- Risk of mortality greatly decreases after the first few weeks of life
- What changed in the calf during this period?

Gastrointestinal Maturation

- Many components to the GI immune system
  - Physical barrier
  - Chemical barrier
  - Immunological barrier
  - Microbial barrier

Gastrointestinal Maturation

- Some components develop after birth
- Catch-22 Situation
  - Passive absorption of macromolecules but increases risk for translocation of microorganisms
- Ideal situation
  - Absorb adequate antibodies
  - No absorption of microorganisms
  - Rapid maturation of the GI tract
- What impacts development of GI immunity?
  - Colostrum, Stress, Environment, Management

Why do so many calves get sick?

- Why do so many calves get sick and die during the first few weeks of life?
- **TAKE HOME: Many holes in GI immune system for the first few weeks**
  - ***Physical Barrier***
  - ***Chemical / Immunological Barrier***
  - ***Microbial Barrier***

Strategies to improve immunity

- What role can nutrition play in reducing enteric disease?

Colostrum

- What is the most important thing we can do on a farm to improve the health of calves?

- What is the goal of colostrum management?

Colostrum

- Most people - "Passive Transfer of Antibodies"
- There is more to colostrum than antibodies
  - Many compounds in colostrum and transition milk are involved in post-natal development of the gastrointestinal (GI) immune system
- Improve calf health if colostrum management is also focused on improving GI maturation

Colostrum

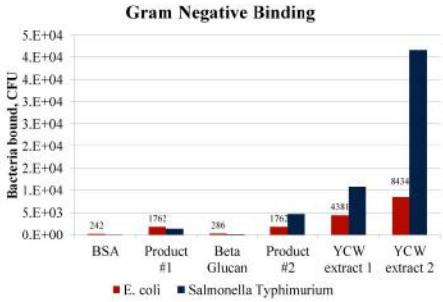
- What about colostrum cleanliness?
  - Ranged from 3,000 to 6,800,000 CFU/mL
  - 43% samples greater than 100,000 CFU/mL
  - 16.9% samples greater than 1,000,000 CFU/mL
- Pasteurize colostrum?
  - 60°C for 1 hour
  - Impacts on GI maturation?
- Colostrum additives?

Morrill et al., 2012, JDS

Strategies to improve immunity

- Prevent interaction of pathogens with calves
  - Prebiotics – not easily digestible carbohydrate
    - *Improve bacterial growth*
    - *Potential binding of gram negative*
  - Probiotics – strict anaerobic bacteria
  - Functional proteins
    - *Colostrum*
    - *Immunized egg*
    - *Plasma*

Binding



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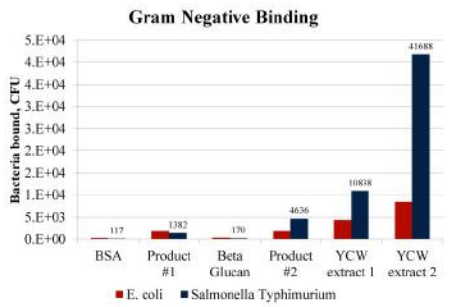

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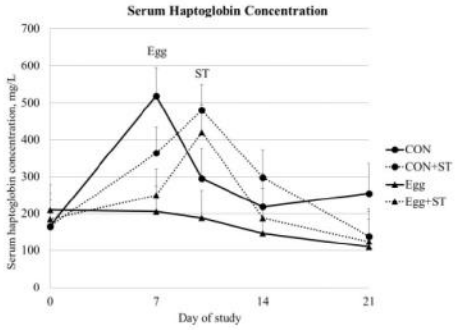


Direct fed microbials

- Putative Probiotic - Mechanisms of Action
- Competitive inhibition – space and resources
- Antimicrobial factors
- Stimulate other mucosal immune defenses

Direct fed microbials

- Ballou (2011) reported that calves (n=45) supplemented twice daily with a blend of prebiotics, probiotics, and hyper-immune egg protein from birth to 21 d of age
  - Less enteric morbidity (25% vs 51%)
  - Less milk refusal d 1 – 4 of life (57 vs 149 g DM)
  - No difference in plasma glucose, urea nitrogen, or haptoglobin
  - No in difference in ADG or efficiency
  - No difference in starter intake

Direct fed microbials

Materials and Methods

- 24 (1-d old) Jersey Bull Calves from a Calf Ranch
- Blocked by total serum protein and initial BW
  - **CONTROL** – Milk replacer only
  - **CONTROL + *Salmonella*** – Milk replacer only & challenged with *Salmonella enterica* on d 7
  - **Probiotic + *Salmonella*** – Milk replacer supplemented & challenged with *Salmonella* on d 7
    - **2 x 10^{10} CFU / d from d 1 to 3**
    - **2 x 10^{9} CFU / d from d 4 to 21**
- Calves were fed 500 g/d of a 22%CP and 20% fat milk replacer
- Ad libitum access to a 22%CP texturized calf starter

Liang et al. unpublished

Direct fed microbials

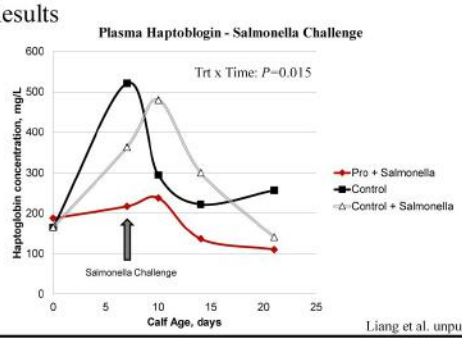
Materials and Methods

- Challenged with log-growth *Salmonella enterica* in morning milk replacer
- BW collected on d 0, 7, 14, and 21
- Blood collected on d 0, 7, 10, 14, and 21
- Histology d 21
  - *Duodenum and Ileum*

Liang et al. unpublished

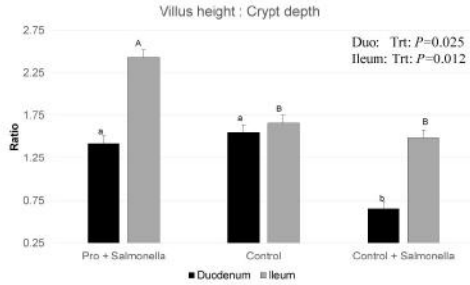
Direct fed microbials

Results



Liang et al. unpublished

Direct fed microbials



Liang et al. unpublished

Direct fed microbials

Conclusions

- Feeding certain strains of lactic acid producing bacteria can increase colonization of those bacteria
- Reduce both measures of systemic inflammation and intestinal inflammation during an enteric disease challenge with *Salmonella*

Liang et al. unpublished

High Risk Calves – Milk supplements

100 calves were enrolled within 24 hours of birth

- Transported from a calf ranch to the Texas Tech Calf facility
- Blocked by total serum protein and initial BW
- Study conducted in 2 consecutive periods
- Individual outdoor calf hutches
- Offered 700 g of a 22% CP / 20% fat milk replacer
  - *0700 and 1600*
- Ad libitum access to pelleted calf starter
- Weaned at 56 d and group housed in pens of 8 – 10 calves
  - *Preweaned – 1 to 56 days*
  - *Postweaned – 57 to 84 days*

Davis et al. unpublished

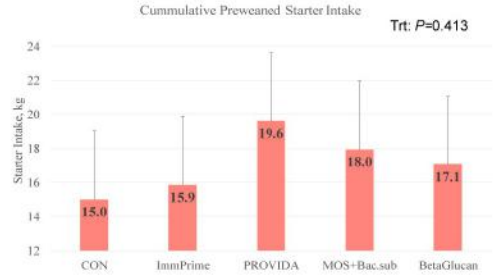
High Risk Calves – Milk supplements

Treatments Included:

- Beta-glucan from mushroom
  - *1 gram of product per day*
- ImmunePrime
  - *Per manufacturer recommendation – first 3 days only*
- PROVIDA Calf – 2 x 10^9 CFU / d
  - *Lactobacillus casei* & *Enterococcus faecium*
- MOS + *Bac. subtilus* – 3 g / d + 4 x 10^9 CFU / d

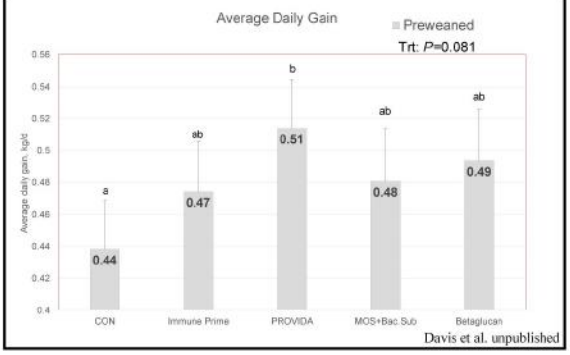
Davis et al. unpublished

High Risk Calves – Milk supplements



Davis et al. unpublished

High Risk Calves – Milk supplements



Davis et al. unpublished

High Risk Calves – Milk supplements

Implications

- Starter intake was variable
  - Numerically greater among the PROVIDA probiotics, MOS+*Bac. subtilis*, and Beta Glucan treatments
- All treatments numerically increased ADG during preweaned period
  - Supplementing the PROVIDA probiotics increased ADG during the preweaned period

Davis et al. unpublished

Strategies to improve immunity -

- **TAKE HOME** - Not all studies reported improvements
  - *Generally regarded as safe*
- Mechanistically speaking these products could reduce risk for enteric disease
- Generalization – possible effect size of 3 to 10 pounds BW gain
- Reduce incidence or intensity / duration of disease

Quantity of milk solids

- How much milk should I feed my calves?
  - Restricted (1 to 1.5 lbs of solids / day)
    - *12% solids (2-3 quarts twice a day)*
  - Similar to nature (2 to 2.5 lbs of solids / day)
    - *12% solids (3 quarts three times a day)*
- Why does the industry limit feed milk?
  - Wean earlier
  - Perception that it's more expensive to raise a calf because 1 lb of milk solids more expensive than 1 lb of calf starter

Quantity of milk solids

- Unfortunately we do not have a good idea of the long-term impacts of restricting milk
- Improved lactational performance
  - ~960 pounds of milk during lactation
- Does plane of nutrition influence health?

Soberon and Van Amburgh, 2013

Quantity of milk solids - Enteric

- Risk for Enteric Disease **<u>High risk calves</u>**
- Coronavirus challenge (Quigley et al., 2006)
  - Days with **<u>scours</u> increased by 53%** when fed the variable program
  - Days on **<u>antibiotics</u>** – **3.1 versus 1.9 d** for variable and conventional, respectively
- Colostrum deprived (Sharon et al., unpublished)
  - 2/18 calves died in both High and Low
  - More High calves bloated **(29.4 vs. 6.7%;** P=0.10)
  - More High calves scoured **(66.7 vs. 22.2%;** P=0.007)
  - 2X feeding @ 15.5% solids

Quantity of milk solids - Enteric

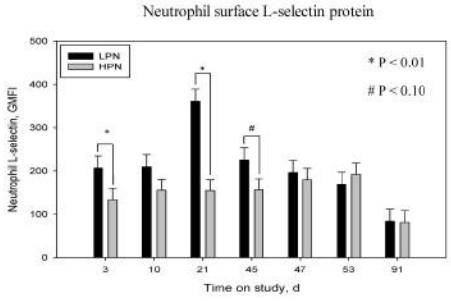
- Cornell Study – *Cryptosporidium parvum*
  - Challenged at 3 days of life
  - Holstein calves fed greater plane of nutrition:
    - *Maintained **better hydration** and **fecal scores improved faster***
    - ***No difference** in oocyst shedding*

Ollivett et al., 2012

Quantity of milk solids - Enteric

- Risk for Enteric Disease **Leukocyte Responses**
- Feeding higher milk solids
  - Greater inflammatory response potential (Ballou, 2012; Liang et al., unpublished)
  - Possibly more rapid upregulation of neutrophil responses upon infection (Ballou et al., 2015)
  - Reduced neutrophil activity during preweaned period (Obeidat et al., 2013; Ballou et al., 2014)

Holstein – Leukocyte function



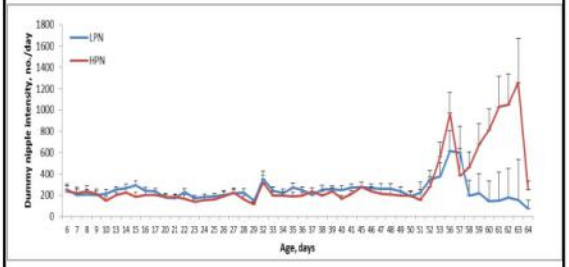
Obeidat et al., JDS 2013

Quantity of milk solids - Enteric

- Digestibility Study – **Healthy Cows**
  - 12 Jersey bull calves fed either a **LOW** or **HIGH** during the 1st week of life
  - Measured everything In minus Out
  - No difference
    - *Fecal DM **(31.9 vs 30.9%)**: despite fecal scores being greater among HPN calves **(1.52 vs 2.06**; P = 0.001)*
    - *Energy digested **(92.8 vs 92.7%)***
  - Protein digestion and retention greater among **HIGH**
    - *Digestible N **(83.7 vs 88.5%)** and N retention **(81.8 vs 86.6%)***

Liang et al., 2016, JDS

Quantity of milk solids - Enteric



Sharon et al., unpublished

Quantity of milk solids - Enteric

- **TAKE HOME** – Risks for Enteric Disease
- Fecal scores are not an appropriate measure of enteric health
- Healthy calves are able to digest and absorb nutrients well during the 1st week of life
- More active neutrophils among LPN calves may reflect less developed GI immune system or elevated microbial exposure (hypothesis)

Quantity of milk solids - Enteric

- **TAKE HOME** – Risks for Enteric Disease
- Complex
  - Pathogen:Calf interaction
  - Unique challenges to every strategy
  - Likely beneficial to feed greater than 2X per day

<u>Adding more milk solids to an existing problem will not solve your problem, vice versa</u>

Quantity of milk solids

- Does early life nutrition influence health later in life?
  - 30 Holstein bull calves fed either **LOW** or **HIGH** and weaned at 54 d of age
  - Challenged with 10^8 PFU/nostril with bovine herpesvirus-1 at 81 d of age
  - Challenged with 10^6,10^7, or 10^8 CFU *Mannheimia haemolytica* at 84 d
  - Observation period through 94 d
  - 4/15 Low calves died consistent with respiratory disease
    - *1, 2, and 1 challenged with 10^6, 10^7 & 10^8, respectively*
  - 0/15 High calves died

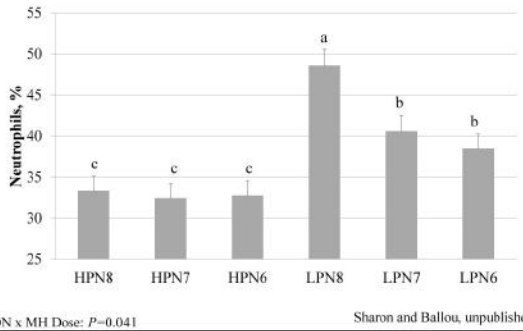
Sharon and Ballou, unpublished

Quantity of milk solids

Quantity of milk solids

Quantity of milk solids

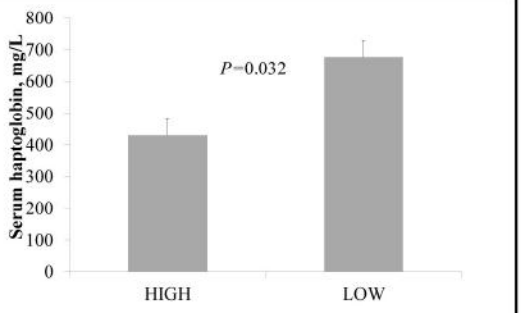
Quantity of milk solids



PON x MH Dose: P=0.041

Sharon and Ballou, unpublished

Quantity of milk solids



Sharon and Ballou, unpublished

Quantity of milk solids

- **TAKE HOME** – Risks for Disease Later in Life
- Data indicating that post-weaned health is improved among calves that were previously fed a higher plane of milk replacer
- Does this continue to persist later in life…?
- So how much milk solids should we feed calves?
  - Evaluate
  - Maximize pre-weaned growth without compromising health

Questions / Comments

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Dr. Trevor DeVries

Ready to make the transition to group-housed calves? Already grouping your calves but seeing some health or behaviour problems? Group housing calves isn't as simple as putting all your calves into one pen. Dr. DeVries shares top tips on grouping calves, why grouping calves can be beneficial, when calves should be grouped, and how to introduce calves to groups.

Dr. Trevor DeVries is a Canada Research Chair in Dairy Cattle Behavior and Welfare and Professor in the Department of Animal Biosciences at the University of Guelph. Trevor received his B.Sc. in Agriculture from The University of British Columbia (UBC) in 2001. Immediately following he began graduate studies at UBC, where he received his Ph.D. in 2006. Following that, he spent one year as a post-doctoral fellow with Agriculture and Agri-Food Canada. In 2007, he was appointed as faculty with the University of Guelph in the Department of Animal Biosciences. In this position, Trevor leads a highly productive research program focused on dairy cattle nutrition, management, behavior, and welfare.

VEAL Farmers of Ontario

Your calf care partners

Group Housing of Calves: Why, When, and How?

Healthy Calf Conference – November 27 and 29, 2018

Trevor DeVries
tdevries@uoguelph.ca

Housing options from birth to weaning….

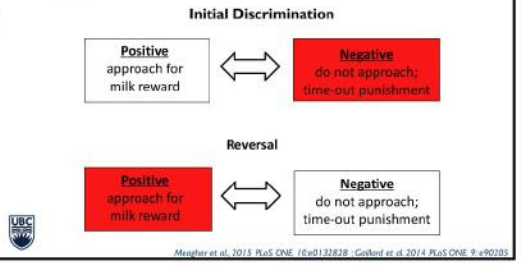
Individual housing

- Advantages
  - Reduce pathogen spread from animal to animal
  - No competition for resources
- Disadvantages
  - More labour intense
  - Limited social contact for calves

Social housing environment…

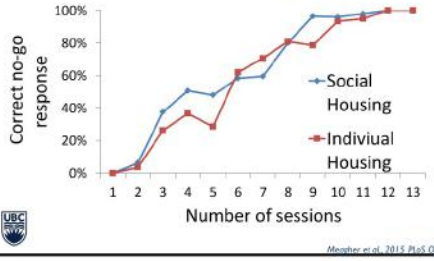
- Grouping calves…
  - Improves…
    - Social skills and cognition (Gaillard et al., 2014; Meagher et al., 2015; Bolt et al, 2017)
    - Solid food intake (Phillips, 2004; De Paula Vieira et al., 2010; Miller-Cushon et al., 2016)
    - Growth (Warnick et al., 1977 Chua et al., 2002; Miller-Cushon et al., 2016)

Cognitive testing



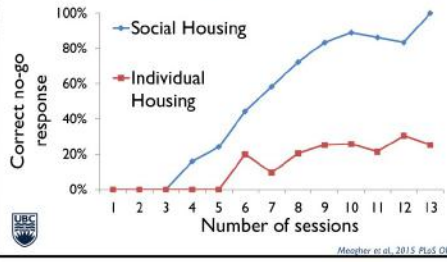
Meagher et al, 2015 PLoS ONE 10:e0132828 ; Gaillard et al, 2014 PLoS ONE 9: e90205

Discrimination learning



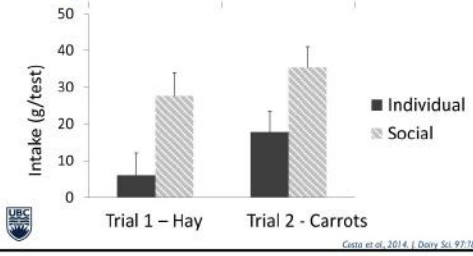
Meagher et al, 2015 PLoS ONE 10:e0132828

Reversal learning



Meagher et al., 2015 PLoS ONE 10:e0132828

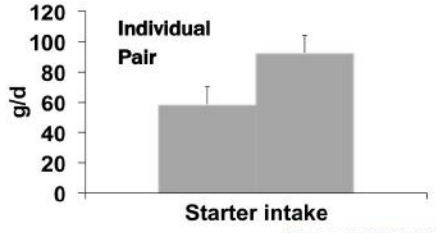
Individually reared calves are more neophobic



Costa et al., 2014. J. Dairy Sci. 97:7804-7810

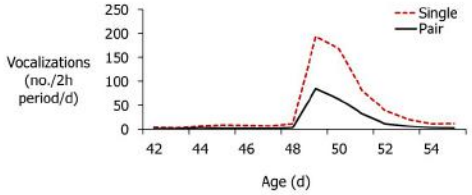
Impact of social housing on intake and growth…particularly at weaning

Feed intake during milk feeding phase



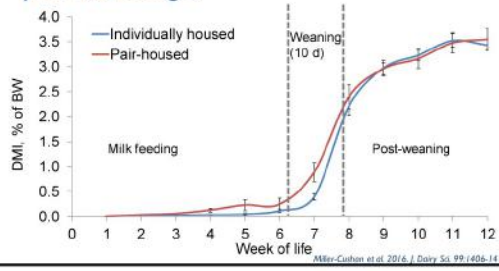
De Paula Vieira et al. 2010. J. Dairy Sci. 93: 3079-3085

Weaning distress reduced when calves are pair housed



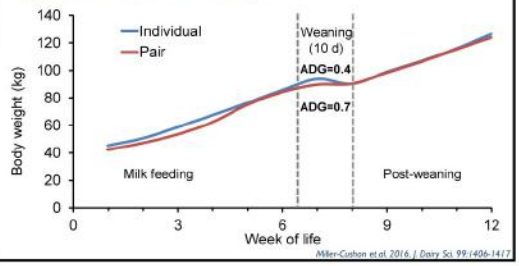
De Paula Vieira et al. 2010. J. Dairy Sci. 93: 3079-3085

Pair-housed calves consumed more concentrate prior to weaning…



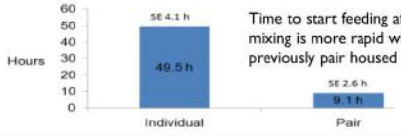
Miller-Cushon et al. 2016. J. Dairy Sci. 99:1406-1417

Pair-housed calves also experience less of a growth check at weaning…



Miller-Cushon et al. 2016. J. Dairy Sci. 99:1406-1417

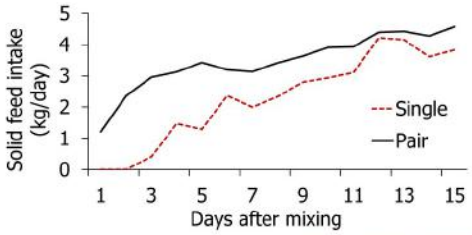
Paired calves do better after weaning…



Time to start feeding after mixing is more rapid when previously pair housed

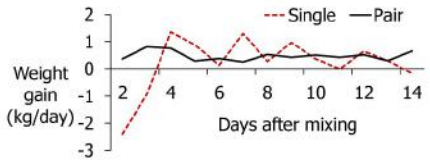
De Paula Vieira et al. 2010. J. Dairy Sci. 93: 3079–3085

Feed intake after weaning and mixing



De Paula Vieira et al. 2010. J. Dairy Sci. 93: 3079-3085

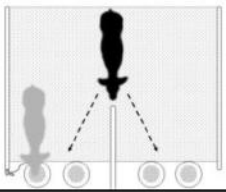
Individually housed calves gained less weight in the days right after mixing



De Paula Vieira et al. 2010. J. Dairy Sci. 93: 3079-3085

Does socialization affect where and when calves want to eat?

- Modified Y-maze test…



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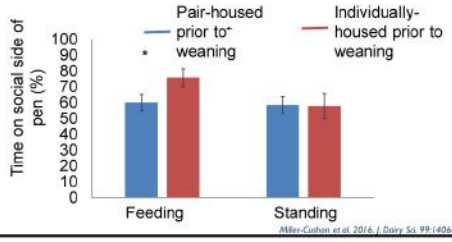
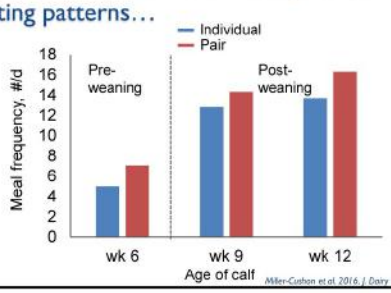
Does socialization affect where and when calves want to eat?



Miller-Cushon et al. 2016. J. Dairy Sci. 99:1406-1417

Pair-housed calves also developed healthier eating patterns…



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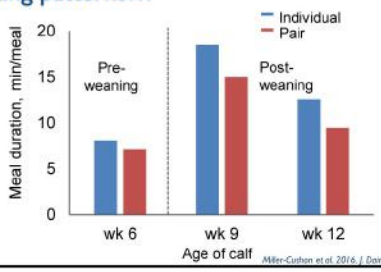
Pair-housed calves also developed healthier eating patterns…



Miller-Cushon et al. 2016. J. Dairy Sci. 99:1406-1417

Social housing environment…

- Grouping calves…
  - Does not necessarily increase health concerns…
    - Dependent on hygiene, air quality, immune status
    - Risk is greater in larger groups (Svensson et al., 2003; Svensson and Liberg, 2006)

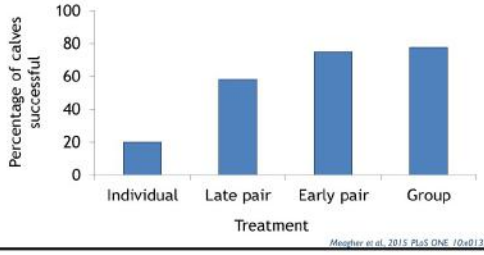
Social housing environment…

- Grouping calves…
  - Does not necessarily results in cross-sucking…
    - Non-nutritive sucking (cross-sucking) occurs when calves…
      - Are not provided enough milk
      - Drink their milk too fast
      - Do not have the ability to express sucking behavior

de Passillé. 2001. Appl Anim Behav Sci. 72:175-187.

What type of contact is needed?

Type of contact: Reversal learning

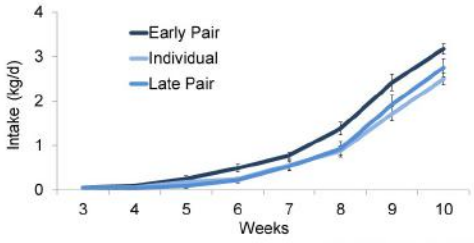


Meagher et al. 2015. PLoS ONE. 10:e0132828

How early do we need to group calves to see a benefit?

- Costa et al. 2015
  - 6 vs 43 d
    - Greater calf starter intake and growth in early-paired calves
- Bolt et al. 2017
  - 5 vs 28 d
    - Early-paired calves demonstrated more ability to cope with stress

Early paired calves have higher intakes



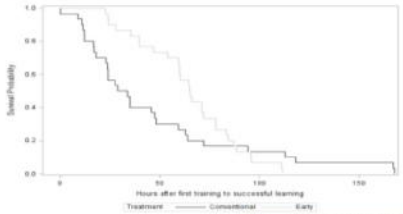
Costa et al. 2015. J. Dairy Sci. 98:6381-6386

What options do we have for grouping calves?

Grouping calves also provides more automated feeding options…

How early should we introduce calves to using a milk feeder?

Calves introduced early (1 d of age) take longer to use automated milk feeder than those introduced at 5 d of age



Medrano-Galarza et al. 2018. J. Dairy Sci. 101:9371-9384

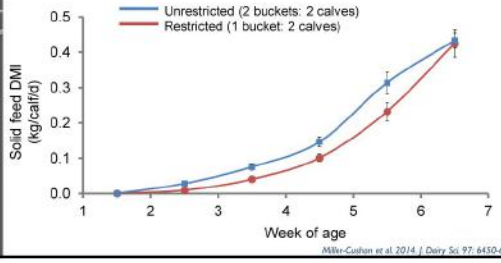
How early should we introduce calves to using a milk feeder?

- No difference in growth
- Calves introduced at 5 days of age required more labor due to the chores involved with manual feeding for 4 days

Medrano-Galarza et al. 2018. J. Dairy Sci. 101:9371-9384

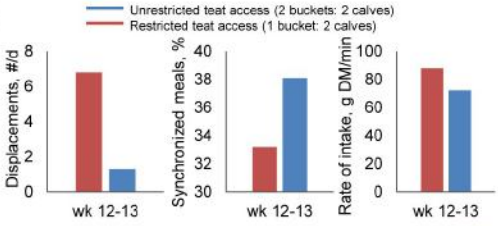
In a group environment calves also want to be able to feed at the same time

Effect of competition on solid feed intake



Miller-Cushon et al. 2014. J. Dairy Sci. 97: 6450-6462

Behavioral patterns persisted through and post-weaning



Miller-Cushon et al. 2014. J. Dairy Sci. 97: 6450-6462

Best practices for housing milk-fed calves….

- Group house calves where possible
  - Introduce calves to pairs/groups early
  - Smaller groups may be better
    - 35 sq feet per calf (DCHA Gold Standards, 2016)
  - Minimize competition for resources
    - More feeding places
    - Keep calves together of similar age
      - All-in, all-out preferable!

QUESTIONS???

Trevor DeVries
tdevries@uoguelph.ca

Thank you to Dairy Farmers of Canada, Natural Sciences and Engineering Research Council of Canada, Ontario Ministry of Agriculture, Food and Rural Affairs, Canadian Foundation for Innovation, the Ontario Research Fund, Nutreco, Shurgain, the University of Guelph and the UBC Animal Welfare Program for support of this research.

Dr. Dave Renaud

Are calves included in your regular herd health visits, or are they overshadowed by milking herd health concerns? By ensuring your veterinarian includes calves in the herd health visit, you are able to ensure the future of your herd will be as profitable as possible. Calves who receive the highest quality care will provide a high return on investment once they enter the milking herd. Your veterinarian is an extra set of eyes in the calf barn and can be key to overcoming common calf health challenges. Calfhood disease is common, but it shouldn't be normal! Working closely with your veterinarian can help calves avoid the common roadblocks to success.

Dr. Dave Renaud is an Assistant Professor at the University of Guelph and a Consultant with ACER Consulting. His research focus is on identifying factors associated with calf health, specifically in the veal sector. Dr. Renaud developed an interest in the health and welfare of dairy calves during his time working with a large veal operation and through the development of the "*Code of Practice for the Care and Handling of Veal Cattle*". He is also a practicing veterinarian who focuses on preventative medicine to improve the health and welfare of dairy cows and calves.

VEAL Farmers of Ontario

Your calf care partners

Rethink Herd Health

Implementing a calf health program

Dave Renaud
University of Guelph/ACER Consulting/Upper Grand Veterinary Services
November 26th, 2018

More than just reproduction!

- Components of herd health
  - Reproduction
  - Transition
  - Milk production
  - Udder health

What is herd health?

- Method to optimize health, welfare, and production in a population of animals through systematic analysis of relevant data and through regular objective observations of the animals and their environment, such that informed, timely decisions are made to adjust and improve herd management over time

TEAM APPROACH

More than just reproduction!

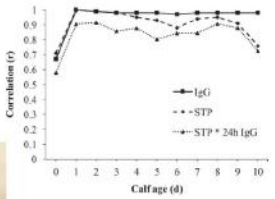
- Components of herd health
  - Reproduction
  - Transition
  - Milk production
  - Udder health
  - **Calf management**

What is herd health?

What does your veterinarian do at herd health?

Monitoring Colostrum Management

- Total protein
  - Blood samples from 1 – 9 days of age
  - Marker of success of colostrum management program
  - Cutpoint of 5.5mg/dL
    - Alarm = above 30%



Source: Wilm et al., 2018. Technical note: Serum total protein and immunoglobulin G concentrations in neonatal dairy calves over the first 10 days of age

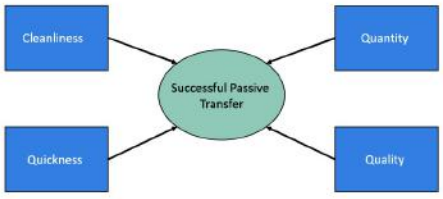
Monitoring Colostrum Management

- Total protein

- Colostrum quality
  - Done on colostrum samples
  - > 22% fed to calves
  - Alarm: > 10% of samples poor quality

Source: Bielmore et al., 2010. An evaluation of Brix refractometry instruments for measurement of colostrum quality in dairy cattle

Components of Colostrum Management



Monitoring Colostrum Management

- Total protein

- Colostrum quality

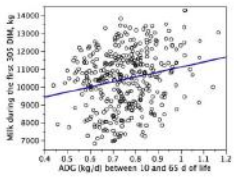
- Colostrum cleanliness
  - Laboratory culture of as-fed colostrum
    - Alarm: > 10% > 5,000 cfu/ml total coliform or > 50,000 cfu/ml total bacterial count
  - Luminometer for feeding equipment cleanliness
    - On-farm test

Source: Godden, 2008. Colostrum management for dairy calves; Renaud et al., 2017. Validation of commercial luminometry swabs for total bacteria and coliform counts in colostrum feeding equipment. Lindley, 2015. OARP Proceedings

Does your veterinarian collect this information?

Monitoring Growth

- Preweaning
  - Weight tape or scale at birth and weaning
  - Target: 850 g/day

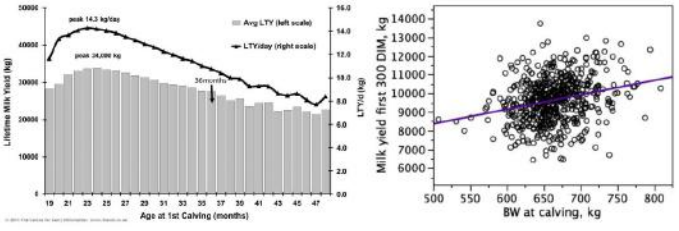


Monitoring Growth

- Preweaning

- Post-weaning
  - Weight tape or scale at breeding
  - Measure height at breeding
  - Targets:
    - 900 g/d in the post-weaning period
    - 60% of mature body weight by breeding
    - 85% of mature body weight by calving

Growth Performance



Source: Mathes, 2014. Heifer fertility and carry over consequences for life time production in dairy and beef cattle.

Does your veterinarian collect this information?

Monitoring Health



Monitoring Health

- Important area to ensure tracking changes overtime
- Disease
- Mortality
  - DHI or Dairy Comp records especially for stillbirths
  - Written records or look for missing ear tag numbers
  - Targets:
    - < 5% stillborn
    - < 3% of calves die in the preweaning period
    - < 1% of calves die post-weaning

Monitoring Health

- Important area to ensure tracking changes overtime
  - Implement preventative practices or management changes when high levels
  - Develop and/or refine treatment protocols

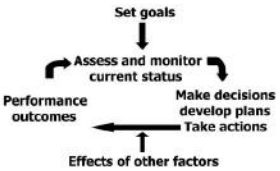
Does your veterinarian collect this information?

Monitoring Health

- Important area to ensure tracking changes overtime
- Disease
  - Monitor through antibiotic and/or supportive treatment records
  - Perform calf evaluation at herd health visit
  - Targets:
    - < 15% of calves are treated for diarrhea pre-weaning
    - < 10% of calves are treated for pneumonia

What do we do with this information?

The Health Management Cycle



Source: LeBlanc, 2006 Major Advances in Disease Prevention in Dairy Cattle

What do we do with this information?

DAIRY at GUELPH
CANADA'S DAIRY UNIVERSITY

- Informed decision making
- Goal oriented approach
- Someone needs to look at the data!

Source: LeBlanc, 2006. Major Advances in Disease Prevention in Dairy Cattle

Take Home Messages

DAIRY at GUELPH
CANADA'S DAIRY UNIVERSITY

- Traditional herd health approach needs to be refined
- Monitoring calf health management can be rewarding
- Someone needs to take charge with a team approach working best!

Calf Care Panel

The old saying, “Where you have livestock, you have deadstock”, can seem especially true among unweaned calves. What if it was possible to not only reduce your mortality rate, but have *zero* mortality in your calf barn? These progressive calf managers are examples that you can have extremely low, or even zero mortality in your calf herd. They will share the tips and tricks they use to help their calves thrive.

VEAL Farmers of Ontario

Your calf care partners

Aaron Keunen

Aaron is a graduate of Ridgetown College, University of Guelph. As a part owner, he works with Mapleview Agri Ltd. in Palmerston, Ontario. Mapleview Agri Ltd. is a family owned business specializing in the manufacturing of milk replacer. He started with Mapleview Agri Ltd. in 2013 as their Cattle Division Manager, where he manages 18 contract cattle feeders in Southwestern Ontario. This includes cattle procurement, marketing, and protocol implementation. Since then, his role has evolved to include Research Coordinator, as well as Sales Support in Western Canada. In 2016, Mapleview Agri Ltd. built a research facility that houses 320 calves and completes milk replacer and feed additive trials. As Research Coordinator, he connects with industry partners and academic institutions to arrange and conduct research projects. Aaron believes implementing calf protocols validated through research is an important pillar in reducing calf mortality on any operation.

VEAL Farmers of Ontario

Your calf care partners

Healthy Calf Conference

AIMING FOR ZERO MORTALITY

Aaron Keunen

How WE DO IT

At 12 weeks of age our calves are relocated to a facility to be finished for Veal or Dairy Beef.

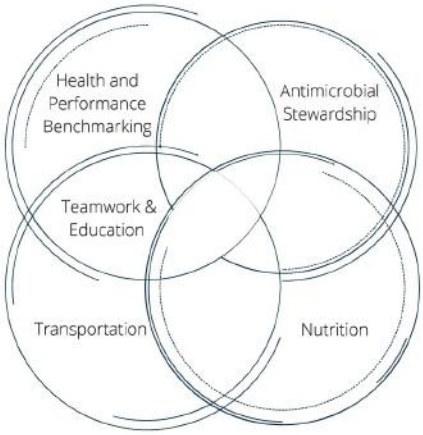
Cattle at our finishing facilities are fed free choice whole corn and a concentrate pellet with 2% fibre mixed into the ration.

What WE DO

We operate an innovative 3000 head cattle operation, where we focus heavily on young animal performance as well as bench marking, cost of production, and protocol development and implementation.

Our integration with Mapleview Agri Ltd. allows us to examine different aspects of calf performance through research projects to ensure our calves are receiving proper treatment and nutrition.

OUR FOCUS



How WE DO IT

We raise calves in mechanically ventilated barns, as well as outdoors in hutches.

We feed them properly formulated milk replacer, as well as a high quality calf starter.

Calves are fed milk in bottles or pails depending on the circumstances.

Challenges WE FACE

- Pathogen Presence
- Movement Stress
- Co-mingling multi-source calves with unknown backgrounds

Benchmarking PERFORMANCE

Cattle are weighed at selected intervals to determine average daily gain (ADG).

Benchmarking allows us to make educated decisions based on the performance of the calves.

Different variables may be present so it is important to assess each operation individually.

Age (Days)	Weight (lbs)	Daily Gain (lbs)
Birth	100	0.5
7	104	1
14	111	1.5
21	121	1.5
28	132	1.75
35	144	2
42	158	2.25
49	174	2.5
56	191	2.5
63	209	2.75
70	228	3
77	249	3
84	270	3.25
91	293	3.25

RESPIRATORY

We see large variations in air quality in a similar environment based on air flow.
A study done at Mapleview Agri Ltd. on over 1600 calves has shown an increased incidence of respiratory challenge calf based on which row they are located in a room and the proximity to the fresh air inlet.

We believe it is important to understand the variation in ventilation within the same environment.

Diarrhea HEALTH SCORING

Scoring systems are used to determine when a calf needs to receive antimicrobial therapy.

When assessing Fecal Scores on arrival – 15% of calves on arrival had a fecal score of 3 or 4 (Renaud et al., 2017).

Fecal Score	Description
1	Normal
2	Loose
3	Runny Abnormal Colour
4	Watery Separation

(Mcquirk, 2008)

- A score of 3 would require fluid therapy.
- A score of 4 would require antimicrobial treatment.

We provide electrolytes to each calf daily from day 3 to 10 to reduce incidence of dehydration.

TRANSPORTATION

We strive to reduce the number of times calves are moved, to reduce performance losses as a result of transport stress.

Following movement only about 22% of the calves eat on the first day, 36% on day 2, and about 68% on days 3-7. (Vermiere, 1997)

All of our calves are a minimum of 12 weeks of age before they are relocated to the finishing facilities.

Manure is removed from trailers weekly and sanitized using chlorine dioxide. A dissinfectant solution which has shown efficacy against C. parvum (ClO2), (Chauret et al.,2001) as well as other pathogens.

Respiratory HEALTH SCORING

Any calf with a score of 5 or greater would require an antimicrobial treatment.

We work closely with our veterinarian to determine the order and number of antibiotic treatments we should use for BRD.

Symptom	Points
Eye Discharge	2
Nasal Discharge	4
Cough	2
Rapid/Difficult Breathing	2
Temp ≥ 39ºC	2
Ear Droop/Head Tilt	5

(Love et al., 2014)

Milk Replacer NUTRITION

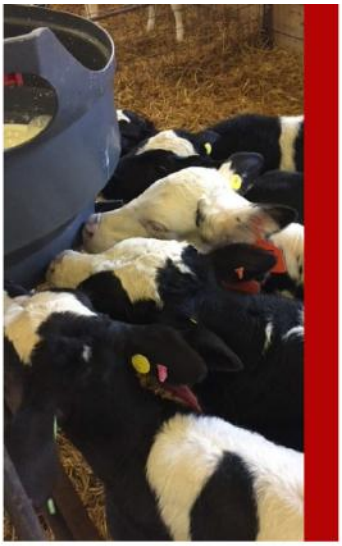
Calves receive a milk replacer consisting of 26% protein and 17% fat milk replacer from day 1 until weaning at day 49.

Each calf receives 35-40kg of milk replacer throughout the pre-weaning period.

Feeding a high protein milk replacer product results in a faster gaining calf.

Milk Replacer NUTRITION

Another comparison of a whole milk formulated milk replacer (26-32) revealed a significant reduction in ADG compared to feeding an accelerated milk replacer (26/17).



Challenge MANAGEMENT

Reduce stress on arrival by feeding electrolytes and providing pain management for visibly stressed calves.

Provide a clean and dry space to reduce chance of further infections.

Manage existing navel infections through antimicrobial treatment. We use an antibiotic from a class of broad spectrum antibiotics proven to fight infections.

Wash and disinfect housing prior to receiving new calves.

Allow 7 days to dry housing to reduce number of organisms living in the environment.

Grain NUTRITION

A 21% high energy calf starter is fed for the first 4 weeks.

Calves are then transitioned onto a corn and concentrate mixture (18% CP).

All calves receive a minimum of 2% straw in rations to reduce incidence of rumen acidosis.

Veal and Steers are all fed using a whole corn and pellet ration.

As cattle maintenance requirements we adjust the level of available energy to ensure our cattle can maintain their growth.

All cattle are fed free choice from arrival to finishing.

Challenge MANAGEMENT

We developed a vaccination program to reduce the risk of an outbreak of bacterial and viral pneumonia with our veterinarian.

Complete tissue and fecal samples to determine which pathogens are present during a challenge.

Susceptibility tests help us understand the pathogens and how to manage them as well as which antibiotic may be most effective for that particular challenge.

CHALLENGES

Source

Calves are sourced directly from dairy farms or auction.

Co-mingling multi source calves with unknown backgrounds can create challenges.

Passive Transfer

30% of calves on arrival at our facility failed passive transfer (>5.5).

Navel Scores

25% of all calves arriving have an enlarged navel with heat, or pain.

Pathogens

Cryptosporidium, Salmonella, Rota and Corona Virus, Pasturella multocida, Mannheimia haemolyitca E. coli & BRSV.

OUR TEAM

Our increasing size requires us to motivate our team take initiative within their position to go above and beyond.

Our team is passionate about calf health and learning better ways to raise calves.

Benchmarking allows us to motivate our team members through performance and education.

Developing a positive culture has been an asset we believe makes our business successful.

CONCLUSION

We believe these are important aspects for raising calves successfully:

- Adequate Nutrition
- Verified Protocols
- Benchmarking
- Motivated Team

Thank you!

VEAL Farmers of Ontario

Laura Schuurman

Laura grew up on a dairy farm in central Alberta where her parents and brother continue dairy farming today. She moved to Ontario to attend the University of Guelph. After obtaining a degree in biology in 2006, she began working as a herdsperson for Joe Loewith & Sons Ltd. At that point they were milking around 250 cows. Since then, the herd has expanded to approximately 450 milking. Laura's responsibilities have diversified within the herd, but she remains the primary calf manager. By working with the progressive owners at Joe Loewith & Sons Ltd., Laura has been able to implement a calf program that has reduced calf mortality to nearly zero.

VEAL Farmers of Ontario

Your calf care partners

Summitholm Holsteins
Lynden, ON

Laura Schuurman

Calf Care

» 6 L of colostrum at birth: 3 within the first 2 hours, 3 more before 12
» chlorhexidine navel dip
» selenium injection
» dam given a oral calcium bolus at calving, second bolus 12 hours later

Calf Program Overview

- about 500 calves/year
- 54% heifer calves
- from Sept 2016 to Sept 2018, preweaned mortality was less than 1%. None of those deaths were due to infectious disease.
- morbidity was about 1 in 15.

Calf Care

» 2 X 2 L of transition milk following second colostrum

Calf Care

» Cows move to close up dry cow pen at 3 weeks pre-calving
» Given monesin bolus
» Calves born on to straw/sawdust bedded pack

Calf Care

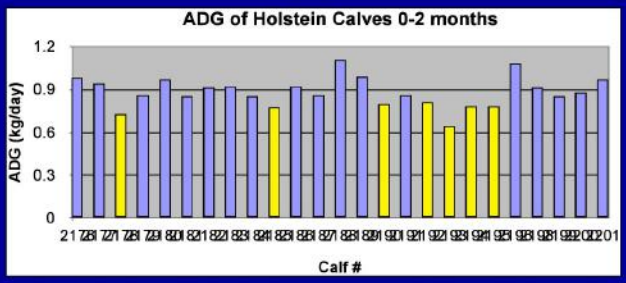
» Housed in hutches year round for first 9 weeks

Calf Care

- » Hutches lifted to provide extra air flow in summer
- » All calves wear coats below 10C

Heifers

- » Weaned at about 8 weeks of age
- » ADG is about 880g/day



Calf Care

- » Step down weaning
  - » 10.5L/day for weeks 1-4
  - » 7L/day for weeks 5-6
  - » 3.5L/day for weeks 7-8
  - » week 9 only water
- » Free choice water/calf starter/chopped straw
- » Straw and starter mixture fed during week 8 and 9

Sick Calves

Calf Care

- » Disbudded at 5-6 weeks
  - » nerve block+sedative
  - » pain medication given at disbudding
  - » supernumerary teat removal at disbudding
  - » A viral pneumonia intranasal vaccine given between 6-8 weeks of age

Sick Calf Care

Level 1	Actions Taken

• two skipped or partially consumed feedings
• calf appears dull/depressed
	• temperature taken
	  • if fever, meloxicam and florfenicol given
	• manure observed
	  • if scours observed, oral electrolytes offered via bottle
	• checked for bloat/respiratory issues
	  • if bloated, an anti-gas is given orally
	  • if breathing heavily, meloxicam and florfenicol

Sick Calf Care

Level 3
- still usually scour related
- calf displays severe dehydration, inability to stand steadily, hind quarters wet and dirty
- no suckle reflex
- at this stage, hours matter.

Actions Taken
- requires a call to the vet for IV electrolyte solution
- a sodium bicarbonate solution is often added to the bag of fluids to counter any acidosis the calf may be experiencing
- calves usually respond to IV in 6-8 hours (often faster)
- once calf has recovered sufficiently, actions from level 2 are followed until calf is back to normal

Sick Calf Care

Level 2
- calf continues to skip or partially consume feedings
- usually associated with scours
- scouring worsens, calf becomes more depressed
- calf does not voluntarily come out of hutch at feeding time

Actions Taken
- switch from bowl feeding to bottle feeding
- increase frequency of feeding, alternating with oral electrolytes
- if persisting for longer than 3 days, a repeat treatment of meloxicam and florfenicol given
- calories, hydration, and pain management are key

Heifer Facility

» Built in 2014 for heifers 2-6 months

Heifers

- Positive pressure ventilation tubes installed one year later

Questions?

Jayne Dietrich

Jayne is a graduate of Centralia College, where she was a class 9 participant of Advanced Agricultural Leadership. She is an alumni of Outstanding Young Farmers (representing Ontario), and past president of Bruce County Federation of Agriculture. Jayne, along with her husband Ralph, son Greg, and son-in-law Andrew Bennett, own Character Dairy Genetics in Mildmay, ON. They are responsible for the birth of 80-100 calves per month and raise up to 350 bottle-fed calves at a time in Wisconson-style barns. Like the title of this panel, “Aiming for zero mortality” is certainly a goal of their operation.

VEAL Farmers of Ontario

Your calf care partners

HEALTHY CALF CONFERENCE

Character Dairy Genetics

Jayne Dietrich

We also have experience with robot feeding

General Overview

- Raised over 3500 calves since April of 2015
- Calf mortality is under 1%
- We range from 80 to 100 calvings a month
- Average daily weight gain is 1.29kg/day during the first 120 days of life

Maternity barn overview

Calf hutches work really well !

Housing

- Four Wisconsin style barns for calves ranging from 0-95 days in age
- Each barn can house 78 calves in individual stalls
- Ventilation includes air inlets, automatic curtains and fans (modified natural/active ventilation)
- Each individual pen is bedded with shavings only due to logistics of storage and management of straw
- For warmth, jackets are placed on calves less than 48hours old when it is 20 degrees and below, they are also given heat lamps, in the winter months calves wear jackets for 3 weeks
- Weaned barn consists of mattresses and shaving packs

Colostrum | Bottles | Nipples




Are we prepared for birth ?

Clean maternity pen

Calving equipment

Calf pen


How do we manage babies health?


Are we prepared for the baby?

Calf processing

- Ear tag
- Navel care
- Drying the calf
- First shots

High quality Colostrum

- We test greater than **25% with refractometer** to be used

Calf feeding utensils

Standard operating procedures

STANDARD OPERATING PROCEDURE

Area:	CLEANING	Document #
Section:	BOTTLES	CLEANING-01
Author:	Laure Dietrich	
		Effective Date: May 1 2019
Tags:	Cleanliness, Health	Last Edit Date: June 2017

OBJECTIVE To stop any possible transition of pathogens, promote healthy growth of calves

PROCESS TITLE	DESCRIPTION
Personnel	CCF Staff
Materials	Dishwasher Gloves Bottles Nipples Rail Drying
Process Steps	1. Empty bottles of all leftover milk and electrolyte into sinks 2. Over the down in the floor flip bottles to top down position using an empty dishwasher bottle rack and place over bottles and flip upside down (do not flip bottles on the dishwasher table as it causes milky water) 3. Check temp of the water in dishwasher if not hot – at least 140- pull plunger and run water for a few minutes until hot. Replace plunger. 4. Slide rack with bottles into dishwasher, close sides fully to allow full wash. Open sides and remove from opposite sides and place on clean bottle cart. 5. Spray down floor and wipe dishwasher with apron and polish
Frequency	Every feeding in wash bin - Soak and brush bottles with cleanser for every baby and prior to starting a new pail
Evaluation/Validation	- Bottles smell fresh - Bottles are not slick to touch when running finger on inside lip - Random bacteria swabs
Related Documents	Cleaning SOP

WEANED CALVES

Helpful ideas

Dehorning, weaning and IVs

Calves are dehorned at 30 days of age

- Pain is managed with Lidocaine and Rompin
- We use an electric dehorner after trimming hair around horn

Weaned over 3 weeks

- Phase 1: Reduced Milk
- Phase 2: Reduced number of feedings
- Phase 3: Weaned fully
- Phase 4: Moved to weaned barn

Strategies for success

- Cardboard to prevent a draft
- Eyebolts to attach fronts
- Snow fence for ventilation on the backs of hutches
- T bars for IV stands
- Stainless steel bowls for babies
- Translucent feed pails – bright colours
- Snap hooks and bungee cords
- Clipboards
- Receptacles for heat lamps
- Storm doors for hutches

VEAL Farmers of Ontario

Your calf care partners

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